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# DoD IACS Information Analysis Centers





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## Joint Strike Fighter Health Monitoring System

NTIAC developes a real-time health NTIAC developes a real-time neatin monitoring system for the Joint Strike Fighter funded by the Office of the Naval Research. The ultimate goal is to install the equivalent of a central nervous system in the Joint Strike Fighter, which can instantly report structural health conditions to the report structural health conditions to use crew while in flight. A network of miniaturized acoustic emission sensors, mounted throughout the aircraft, would continually monitor the various components and structures during operation.

American Airlines Airbus A300 Aircraft like the one that crashed in New York after the composite tail separated from the aircraft. NTIAC has developed and field tested a



from the aircraft. NTIAC has developed and field tested an inspection method to detect damage in composite tails prior to breaking. The method does not require disassembly of any components.

### Continued on Story 1



## Nondestructive Inspection of **Aluminum Compressed Gas Cylinders**

Compressed gas cylinders form an integral part of our daily lives. From fire extinguishers to propane tanks, these containers are used throughout our homes and places of work, and as such their integrity is a vital concern. Nowhere is this truer than in the case of compressed air cylinders, including the Self-Contained Underwater Breathing Apparatus (SCUBA) used by divers and the Self-Contained Breathing Apparatus (SCBA) used by firefighters across the country.

### Continued on Story 2

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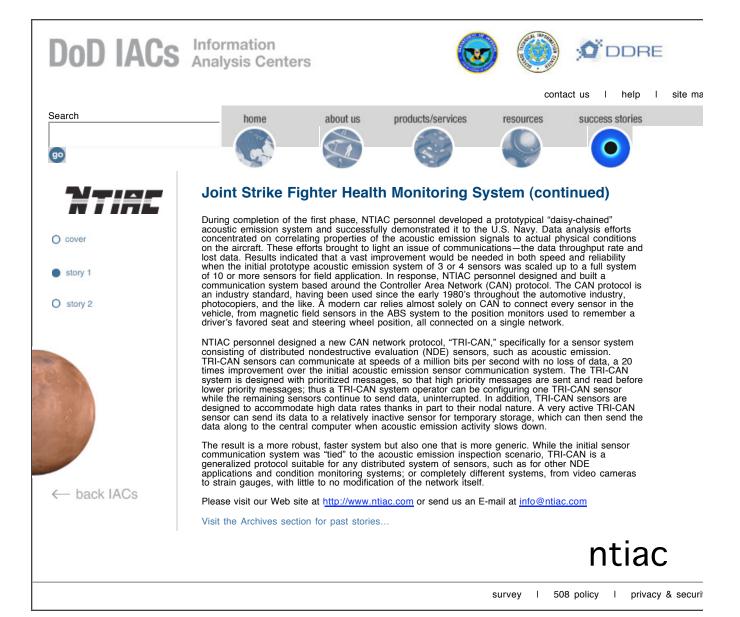
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# DoD IACS Information Analysis Centers DDRE l help contact us - 1 site ma Search products/services home about us resources success stories **Nondestructive Inspection of Aluminum Compressed Gas** Cylinders (continued) Investigations conducted by both industry and the Department of Transportation (DOT) have indicated that although as a whole, SCUBA and SCBA cylinders are safe, as is the case with any such product O cover some safety issues remain. For example, cylinders made of aluminum alloy 6351-T6 are known to be susceptible to sustained load cracking in the neck and shoulder area of the cylinder. Work into the nature of sustained load cracking has offered new insight into its causes and effects. However, one O story 1 key factor in preventing damage or failure from this type of flaw has to date been missing, that is, a reliable method of early detection. Although several nondestructive testing (NDT) methods of inspection have been developed, their efficacy has not been established story 2 In response to this need, the DOT Office of Hazardous Materials Technology, Research and Special Programs Administration (RSPA), contracted the Nondestructive Testing Information Analysis Center (NTIAC) to quantitatively evaluate three common methods of cylinder inspection visual testing (VT), • eddy current testing (ET), and • ultrasonic testing (UT). Conducting an extensive round-robin testing procedure, NTIAC was to evaluate the performance of each technique in terms of its accuracy and reliability in detecting flaws in the neck and shoulder region of the cylinder. To initiate the project, NTIAC arranged to acquire a test population of compressed air aluminum cylinders that varied in age and condition, and that had been used in the field for some time prior to being "condemned" by an inspector and sent back to the manufacturer. The cylinders were first inspected via the three methods of NDT, after which destructive analysis of select cylinders was used to gauge the results. Since the ultimate goal of this project was to recommend a testing technique that can be used by inspectors in the field, it was of utmost importance to go beyond the traditional scope of NDT. In many other NDT applications, the testing is conducted by someone with years of experience and training. In this case, however, the NDT method is to be employed by people unfamiliar with NDT as a discipline, ← back IACs such as a part-time high school student working afternoons in a local dive shop. As such, NTIAC and RSPA both recognized the need to explore the dependence of skill on each inspection technique: an inspector can receive as little as four hours of training before he or she is deemed fit to practice the technique. Results of the project suggest that the skill level of the inspector is a key factor in the performance of the inspection. While there exists a small but appreciable difference in terms of performance between an expert and a skilled inspector, the data indicate that an inspector with only a passing familiarity with the NDT technique fares far worse in terms of his or her After analyzing the results of the round-robin nondestructive testing of the cylinders in comparison with destructive analysis, the optimal NDE method was chosen based upon its ability to detect and size flaws. NTIAC's findings in the aluminum gas cylinders project will form the basis of an RSPA recommendation to the compressd gas cylinder community. Please visit our Web site at http://www.ntiac.com or send us an E-mail at info@ntiac.com Visit the Archives section for past stories... ntiac

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